Alg. 2 Warm Up #10-2

Combine the fractions. Show your thinking.

1. $\frac{4}{5} + \frac{3}{10}$

2. $\frac{3}{4} - \frac{7}{8}$

3. $\frac{5}{x} + \frac{2}{x}$

4. $\frac{3}{x^2} - \frac{5}{x}$

MATH NOTES

METHODS AND MEANINGS p. 135

No = sign

Vocabulary for Expressions

A mathematical expression is a combination of numbers, variables, and operation symbols. Addition and subtraction separate expressions into parts called terms. For example, $4x^2 - 3x + 6$ is an expression. It has three terms: $4x^2$, $3x$, and 6. The coefficients of the terms with variables are 4 and –3. 6 is called a constant term.

A single-variable polynomial is an expression that involves, at most, the operations of addition, subtraction, and multiplication. Most of the polynomials you will work with can be written as expressions with terms of the following form:

(any real number)$x^{\text{(whole number)}}$

For example, $4x^2 - 3x^1 + 6x^0$ is a polynomial, as is the simplified form, $4x^2 - 3x + 6$. Also, since $6x^0 = 6$, 6 itself is a polynomial.

The function $f(x) = 7x^5 + 2.5x^3 - \frac{1}{2}x + 7$ is a polynomial function.

A binomial is a polynomial with only two terms, for example, $x^3 - 0.5x$ and $2x + 5$.

The following expressions are *not* polynomials: $2^x - 3$, $\frac{1}{x^2-2}$, and $\sqrt{x-2}$.

An expression that can be written as the quotient of two polynomials is a rational expression. For example, $\frac{1}{x^2-2}$ is a rational expression.

HW Questions:

Preview

3-90. Multiply or divide the expressions below. Simplify your results.

a. $\frac{x-7}{9(2x-1)} \div \frac{(x+5)(x-7)}{6x(x+5)}$

b. $\frac{6x^2-x-1}{3x^2+25x+8} \cdot \frac{x^2+4x-32}{2x^2+7x-4}$

$$\frac{(3x+1)(2x-1)}{(3x+1)(x+8)} \cdot \frac{(x+8)(x-4)}{(2x-1)(x+4)}$$

$$\frac{(2x-1)(x+8)(x-4)}{(2x-1)(x+8)(x+4)}$$

3-91. For each rational expression below, state any values of the variables that would make the denominator zero. Then complete each part.

a. Use the fact that $(x+4)^2 = (x+4)(x+4)$ to rewrite $\frac{(x+4)^2}{(x+4)(x-2)}$. Then look for "ones" and simplify.

b. Use the strategy you used in part (a) to simplify the expression $\frac{8(x+2)^3(x-3)^3}{4(x+2)^2(x-3)^5}$.

3-92. Monica's younger sister is just learning how to add fractions, and she is confused. She has to add $\frac{1}{3}+\frac{2}{5}$. → $\frac{11}{15}$

Help Monica explain to her by writing a detailed step-by-step explanation of exactly what she needs to do.

3-93. Solve the systems of equations below using any method.

a. $3x-3=y$
$6x-5y=12$

b. $2\{3x-2y=30\}$
$-3\{2x+3y=-19\}$

3-94. Janelle conducted an experiment by mistake when she left her bologna sandwich at school over winter break. When she got back, her sandwich was much larger than it was when she left it. Her science teacher explained that the sandwich had produced large quantities of a rare bacterium, *Bolognicus sandwichae*. Based on a sample taken from the sandwich, Janelle determined that there were approximately 72 million bacteria present. Her science teacher explained that this is not very surprising, since the number of this bacteria triples every 24 hours. Since the sandwich had been made only 15 days ago, Janelle was sure that she could sue the meat company. The food-industry standard for the most bacteria a sandwich-sized portion can have at the time of production is 100. Find out how many of the bacteria were present when the sandwich was made to determine if Janelle has a case.

y = # of bacteria 72,000,000

x = time in days

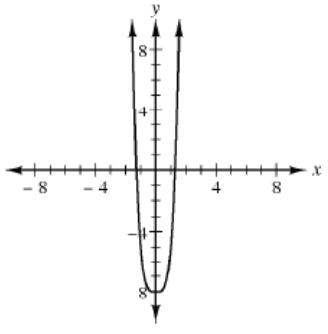
(15, 72 mil)

$y = a(3)^x$

$\frac{72{,}000{,}000}{3^{15}} = a\frac{(3)^{15}}{3^{15}}$

$a \approx 5$

3-95. Determine if the function shown on the graph at right is odd or even or neither? Explain how you decided.



3-96. Solve the equations below. Check your solutions.

a. $\frac{m}{6} = \frac{m+1}{5}$ b. $\frac{3x-5}{2} = \frac{4x+1}{4}$

c. $\frac{8}{k} = \frac{14}{k+3}$ d. $\frac{x}{9} = 10$

$8(k+3) = 14k$

Yellow CP's:

3-88. PUTTING IT ALL TOGETHER

Multiply or divide the expressions below. Leave your answers as simplified as possible. For each rational expression, assume the denominator is not zero.

c. $\frac{5x - 15}{3x^2 + 10x - 8} \div \frac{x^2 + x - 12}{3x^2 - 8x + 4}$

$\frac{5(x-3)}{(3x-2)(x+4)} \cdot \frac{(3x-2)(x-2)}{(x-3)(x+4)}$

$\frac{5(x-2)}{(x+4)^2}$

Yellow CP's:

3-88. PUTTING IT ALL TOGETHER

Multiply or divide the expressions below. Leave your answers as simplified as possible. For each rational expression, assume the denominator is not zero.

c. $\frac{5x - 15}{3x^2 + 10x - 8} \div \frac{x^2 + x - 12}{3x^2 - 8x + 4}$

1·12
2·6
3·4

$\frac{5(x-3)}{(3x-2)(x+4)} \cdot \frac{(3x-2)(x-2)}{(x-3)(x+4)}$

$x \neq 2, 3, \frac{2}{3}$ $\quad \boxed{\frac{5(x-2)}{(x+4)^2}} \quad x \neq -4$

CP's: 3- #97 ---> 100

3.2.4 How can I rewrite? p. 150

Adding and Subtracting Rational Expressions

So far in this course you have learned quite a bit about rational expressions. You have learned how to simplify complex algebraic fractions by factoring the numerators and denominators. You have also learned how to multiply and divide rational expressions. What else is there? Today you will develop a method to add and subtract algebraic fractions.

$\frac{5}{15} + \frac{6}{15}$

3-97. With your team, read your directions for Monica's sister from homework problem 3-92. Verify that everyone obtained the same answer and be prepared to share how you added the fractions with the class.

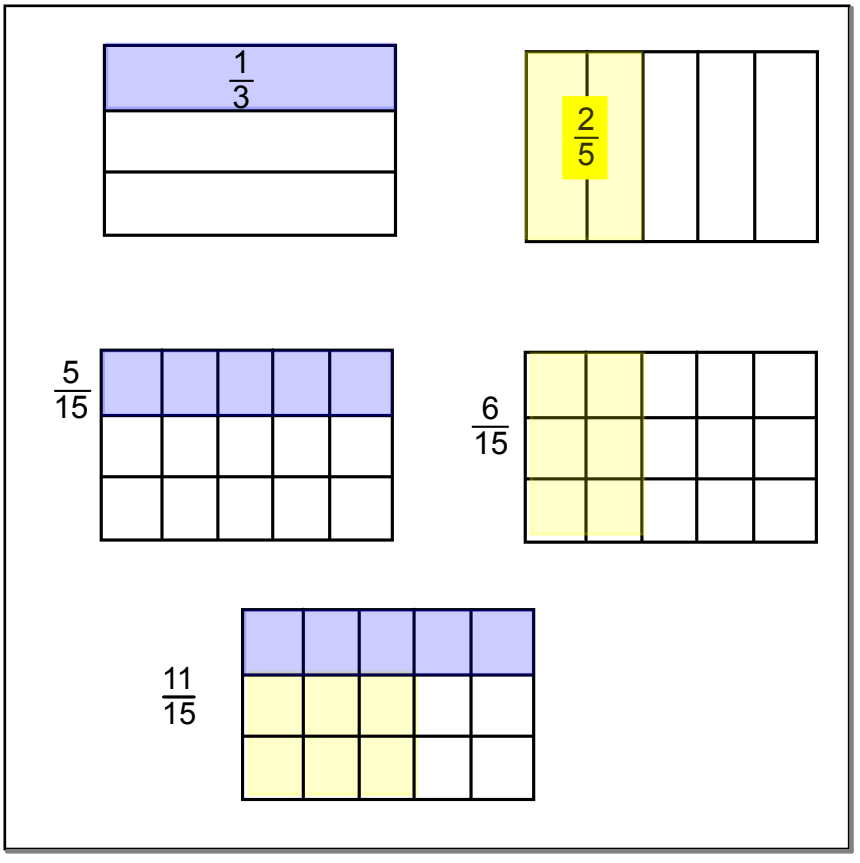
LCD = 15

$\frac{5}{5} \cdot \frac{1}{3} + \frac{2}{5} \cdot \frac{3}{3}$

$\frac{11}{15}$

a. Now Monica's sister wants to know *why*? Why does she have to do all of those steps with the common denominator? What is a fraction anyway, and why does adding them have to be so complicated? Draw some pictures or diagrams or make up some situations that will help her to know what fractions like $\frac{1}{3}$ and $\frac{2}{5}$ mean.

b. Now use your ideas from part (a) to show Monica *why* she needs a common denominator to add the two fractions.



3-98. Extend the procedures your class developed for numerical fractions to add these algebraic fractions.

$$\frac{2x}{x-1} + \frac{3}{x+5}$$

LCD $= (x-1)(x+5)$

$$\frac{(x+5)}{(x+5)} \cdot \frac{2x}{x-1} + \frac{3}{x+5} \cdot \frac{x-1}{x-1}$$

$$\frac{2x^2 + 10x + 3x - 3}{(x-1)(x+5)}$$

$$\frac{2x^2 + 13x - 3}{(x-1)(x+5)}$$

$$\frac{}{(x-1)(x+5)}$$

3-99. Now add the fractions below. After you have added them, be sure to check to see if the numerator can be factored. You may be able get a simpler answer.

a. $\frac{x}{3x+1} + \frac{2x^2-2}{(x-5)(3x+1)}$

b. $\frac{9-3x}{(x+3)(x-3)} + \frac{2x}{x+3}$

LCD $= (x-5)(3x+1)$

3-99. Now add the fractions below. After you have added them, be sure to check to see if the numerator can be factored. You may be able get a simpler answer.

a. $\frac{x}{3x+1} + \frac{2x^2-2}{(x-5)(3x+1)}$ b. $\frac{9-3x}{(x+3)(x-3)} + \frac{2x}{x+3}$

LCD

$(x-5)(3x+1)$

$\frac{(x-5)}{(x-5)(3x+1)}\frac{x}{} + \frac{2x^2-2}{(x-5)(3x+1)}$

$\frac{x^2-5x+2x^2-2}{(x-5)(3x+1)}$

$\frac{3x^2-5x-2}{(x-5)(3x+1)}$ → 1·2

$\frac{(3x+1)(x-2)}{(x-5)(3x+1)}$

$\frac{x-2}{x-5}$

3-100. Examine the expression below.

$$\frac{2x-1}{3x^2+13x+4} + \frac{x+3}{x^2-3x-28}$$

a. With your team, decide how you can alter the expression so that the fractions have a common denominator. Be ready to share your idea with the class.

b. If you have not already do so, add the fractions. Then simplify the result, if possible.

c. Repeat the process to subtract the expressions below. Simplify the result, if possible.

$$\frac{2}{x+4} - \frac{4x-x^2}{x^2-16}$$

HW: 3 -

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